MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
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SCIENCE SYSTEM ADVISORY GROUP

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TITLE	Some initial options for an Advanced Technology Initiative		
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PURPOSE	To present some possible models for an Advanced Technology Initiative in New Zealand		

Contents

Preamble

The Science System Advisory Group (SSAG) has been asked to develop a set of recommendations to strengthen New Zealand's science, innovation and technology system and ensure its future success.

To support the SSAG in its role, the secretariat has prepared this background document on an Advanced Technology Initiative. It outlines initial thinking on the nature and role of critical functions for technological advancement in national innovation systems, and the enabling role such functions play in taking advantage of innovation as a driver of economic competitiveness. It also contains information on international comparisons of functions and a gap analysis of said functions in New Zealand's national innovation system.

This document is intended to be introductory rather than comprehensive. Different criteria for analysis of options could be considered going forward as well as other international case studies, including different options for how to embed critical functions for technological advancement in New Zealand's national innovation system.

The secretariat will be happy to provide more information and detail on these topics on request.

MBIE's policy thinking on the Advanced Technology Initiative is being provided in three distinct documents to align with the SSAG discussions:

1. Document 1: Overview of the technology research ecosystems in New Zealand
2. Document 2: International models for technology research ecosystems
3. Document 3: Potential options for an Advanced Technology Initiative

This is Document 3: Potential options for an Advanced Technology Initiative. It includes both an initial proposal developed by Sir Peter, Hema and Hermann and one separately developed by MBIE. As Sir Peter has noted, there is a very high degree of commonality between these two proposals, though we have not attempted to combine the two in advance of sharing them with the SSAG.

Section 1 - Sir Peter and Hema's Initial Thinking

A National Advanced Technology Organisation – Draft proposal

6th March 2024

New Zealand must be realistic. It has been late to enter the market of science-based innovation based on advanced technologies – particularly AI. It must also be pragmatic; it has neither the human nor fiscal resources to pretend that it competes in the basic discovery and development science of such technologies. Rather, it must play to its strengths of application and data niches and build a distinct approach that's ambitious but appropriate for a small country.

Our concept is that the proposed Advanced Technology Organization (ATO) should be a virtual institute and its structure would bring together government, business, and academia together such that all aspects of the innovation ecosystem are operating cohesively and with a common purpose.

This approach has the advantage that the government can set and incentivize desired outcomes including quality and standards of the outputs and encourage cross sectoral collaboration and growth. It aims to shift the siloed approach and inherent competition that currently exists within our innovation ecosystem.

While the model below focuses on AI and its derivatives as a starting point, it could equally apply to other advanced technologies such as quantum. With a common and centralized backbone that provides the physical infrastructure, governance, and oversight functions as well as business development and outreach functions, it optimizes the investment.

The ATO approach will consist of an overarching layer that provides the business and executive functions with several focused pillars that operate to it. The overarching layer consists of a high-level board that might consist of government, business, and academia representatives. It would be supported by both a technical advisory board (with international representation) and an ambassadorial group to work with both international research, business partners and partnerships.

The proposed pillars below include developmental pillars that are designed around specific research areas while there are several enabling pillars which are designed to provide core capabilities agnostic of the research areas but themselves grounded on research and science.

The enabling pillars are as follows:

The **social** pillar would focus on issues of social license, ethics, standards, and legal dimensions to consider in utilizing advanced technologies. It would leverage international best practices and research to inform its focus and provide guidance. This is an area where NZ already has some global attention.

The **foresight** pillar would focus on technology foresight, assessment and application using advanced practices and methodology. It would consider and advice on the economic, social, intelligence and security dimensions.

The **training** pillar will focus to ensure and/or provide a range of short and long training options and solutions for government officials, practitioners, and key decision makers.

The **capacity building** pillar will provide outreach services and act as an interface to help businesses and other key use groups be able to use advanced technologies wisely and effectively.

The **infrastructure** pillar provides the core physical, digital and data backbone that is needed to support data-intensive and complex initiatives.

The **developmental** pillars (DP) are focused on individual technology areas with a distinct New Zealand lens and where we envisage competitive advantage. There can be any number of these pillars, but each pillar has a limited timeframe for operation. These would undertake the R&D to develop

applications capable of being taken to market. It is proposed that at least four developmental pillars should be established initially. With a focus on AI, these could be as follows:

DP1 - Application of AI to the pastoral economy

Farmers face impossibly complex choices with an increasing access to enormous amounts of data from sensors, drones, satellites, etc. Combining AI with the IoT capability that is currently deployed across the sector, this pillar will look to exploit opportunities to transition to a more sustainable sector. Successful local application of such tools could have significant relevance to a global market.

DP2 - Application of AI for strengthening social policy

New Zealand's Integrated Data Infrastructure (IDI) is a comprehensive database containing social data primarily used to date for research initiatives. The IDI offers many opportunities to utilise AI for applications by the government, community entities and commercial application.

DP3 and DP4 - Application of AI for NZ

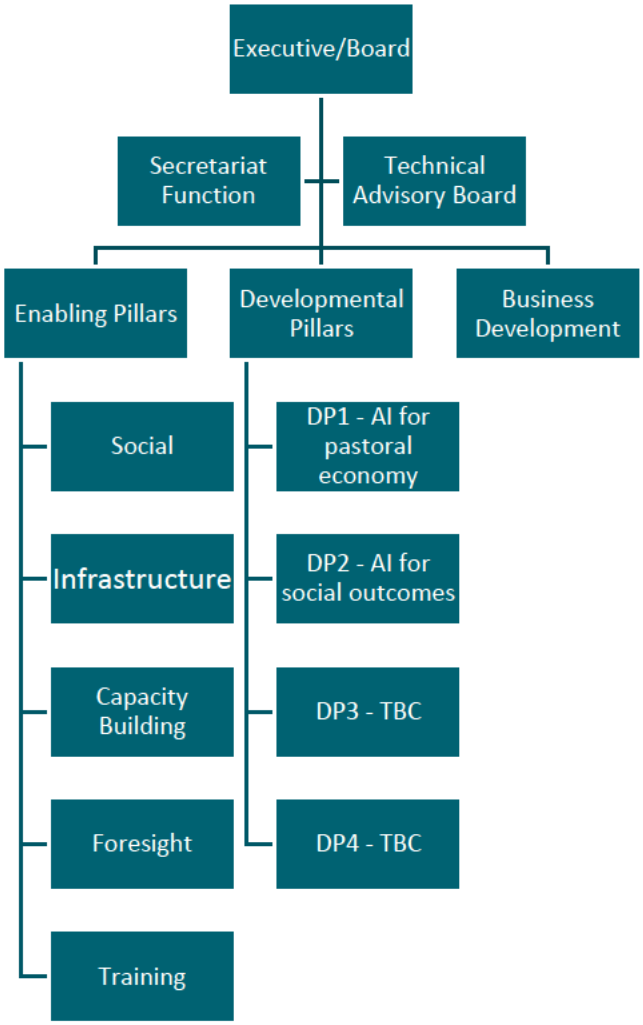
There are several other areas where AI could be leveraged for bespoke NZ applications which could include possibilities in education, smart cities, transport, environmental management, sustainable finance, human-machine interfaces in the sporting sector. These will need to be tested against criteria for establishing a new DP through wider consultation.

The **business development** arm is taking those functions variously embedded within Callaghan Innovation and NZTE as well as other parts of the innovation system (TTOs, KiwiNet, Icehouse, Incubators etc.). Their role will allow spinouts and scale-ups to flourish with an eye to international markets. It would help develop the necessary international connectivity.

The ATO approach strength is that it will seek providers from public and/or private sector to provide the individual pillars and encourages bids from single entities or a consortium with the relevant expertise. These pillar providers will have their own established networks including international partnerships that could be leveraged.

The proposed approach described here has been conceptually tested against several experts in UK, Brussels, and the OECD to gauge its feasibility. The feedback from these experts has been used to refine the conceptual approach presented here. This approach excites them and is seen as innovative and likely to produce unique dividends for New Zealand.

A National Advanced Technology Organisation (ATO) – Proposed Structure



Section 2 - MBIE's Initial Thinking

There are a number of critical functions for technological advancement that are individually and jointly necessary to be effective, which may require us to aim for an indivisible policy package in the long run

1 Competitive economies overseas rely on innovation as a driver of economic growth and focus on global economic competitiveness. This has as a precondition the presence of critical functions and research capability for advanced technologies in a country's national innovation system.

2 New Zealand is unique in having complete gaps in respect to some functions, while others are not contributing effectively.

3 The list of functions in SSAG-MBIE-011 can be conceived as key and necessary building blocks for developing an effective, growth-generating national innovation system. This is expressed in the Temple infographic in Annex 1 (see section 'Transition Path').

Functions can be embedded into national innovation systems in different ways. While the functions themselves are not optional, we have choices around how and when to embed them in our system

4 Each function can be considered on its own terms and there are different forms they can take in national innovation systems. There is no right answer, but what is appropriate or most suitable depends on the idiosyncrasies of already established systems, and what institutions represent the best fit, given conditions.

5 We have choices around how to fill the gaps in our national innovation system. For example, if we consider the strategic tech leadership function, specifically, it can be provided in different ways:

a. by a Ministry and supporting dedicated tech strategy units and hubs within departments that provide technical expertise and advice

b. through a joined-up government/research/industry Technology Research Council that enables whole of government action to support initiatives and new industry opportunities

c. through a committee of experts from science, government and the economy, supported by critical capability and stakeholder engagement, and

d. more devolved options, and more.

Box E: Embedding functions into New Zealand's national innovation system

Annex 1 presents a potential transition path that builds our national innovation system by systematically and progressively embedding critical functions over a period of time.

Annex 2 provides a high-level overview of a slice of our national innovation system where newly needed critical functions may sit.

Annex 3 outlines critical questions for working through whether and how to embed different functions into our national innovation system.

We can draw from typical international models and New Zealand examples to consider ways to imbed functions in our national innovation system

6 Advanced technology supports in other advanced economies generally take one of three forms:

a. Research Programmes (or Funds) generally involve delivery of a defined portfolio of research projects and supporting activities within a specific (programmatic) remit likely undertaken by universities (or a group of universities) and funded by either a single or multiple organisations, such as a research council/agencies or industrial companies.

b. Research Centres (or Networks) generally enable delivery of a defined grouping of initiatives or projects that also span several academic disciplines. These institutes are typically based in universities but operate outside of traditional departmental structures and so have greater degree of independence. Networks can form umbrella ('virtual') institutions comprised of linked research centres. Funding arrangements or platforms can be established through a variety of contractual mechanisms (funding contracts) with existing institutions, such as universities.

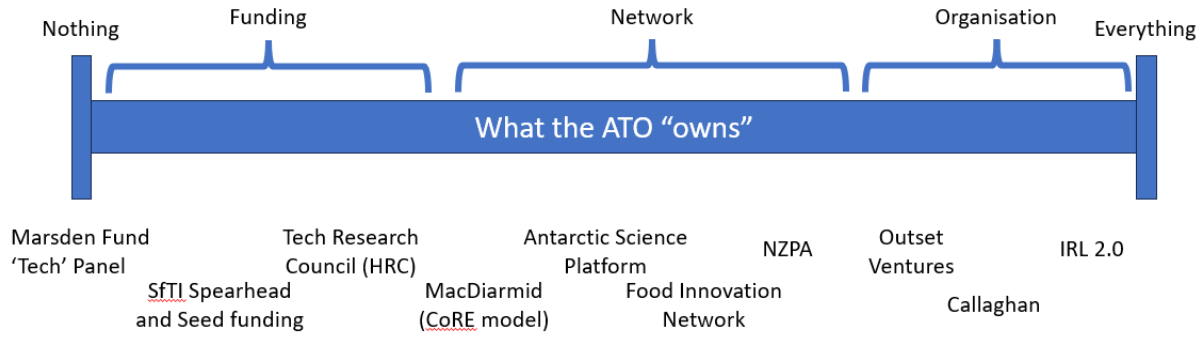
c. Research Institutes (or Organisations) are generally created to enable delivery of strategic objectives and require access to significant capital and resources. They are typically separately established organisations in their own right, with dedicated staff and technical facilities often co-located at other partnering institutions (universities and industry partners). They can also be multi-locational ('hub and spoke').

7 Advanced economies commonly have large scale organisations, or networks of organisations. Examples include CSIRO in Australia, VTT in Finland, the GTI network in Denmark, the Catapult network in the UK (which Hermann Hauser helped to establish), and TNO in the Netherlands. We are an outlier among Small Advanced Economies in not having such organisations.

8 However, in New Zealand, we have invested proactively in the past via a range of our funds to build capability in new areas of advanced technology. These investments have tended to be small and ad-hoc, but have generally been successful within those constraints.

9 There are New Zealand examples of typical models through which technology support functions could be delivered. Figure 1 below distributes New Zealand examples along a continuum that identifies the extent to which these internalise or 'own' tech support/facilitating functions.

Figure 1. *New Zealand models distributed on a continuum of general forms (funds, networks, organisations)*



10 To provide a specific example, one option could be to double down on our current state and not embed a tech leadership function at a higher governance level in our national innovation system. Instead, we could devolve such leadership to an ATO. The downside of this approach would be leaving critical tech functions without support of wider government coherent action and the coordination of cross-system levers, leaving the ATO somewhat stranded. The ATO would likely operate without the convening power of the government to provide credible investment signals and so hamper its ability to attract industry engagement.

Box F: Possible forms: New Zealand models and overseas examples of tech leadership

Annex 4 provides a more detailed description and evaluation of New Zealand Models.

One way forward is to consider possible future scenarios for our national innovation system, and how we may transition over time to embed critical tech functions

11 Embedding critical functions could be undertaken gradually with an end goal in mind. This would be like adding critical building blocks to our system over time, as shown in Annex 1 (transition).

12 The upside of this approach is that we can move quickly and start early with support from a modest amount of funding. This funding could be secured through reprioritisation.

13 The downside of this approach is that the effectiveness of our national innovation system will depend on the whole package of functions being in place, meaning that the real impact of this intervention would be unleashed gradually over time, and only fully once all functions are in place and effective.

FUTURE STATE – For consideration, we present one possible future state of our national innovation system that has embedded in it all the necessary critical tech functions

14 Annex 1 presents a possible future structure of our national innovation system with imbedded critical functions.

15 A hypothetical future state that would be commensurate with overseas investment levels into advanced technologies, and which would reflect the relative size of our economy, could see about $800 million additional investment annually in advanced tech and joint research-industry initiatives:

d. Of this, $300 million public investment would be channelled into the system through a higher-order tech leadership function. Over time a larger proportion of this funding would be matched by private investment (e.g. through industry led Cooperate Research Centres).

e. The remaining $500 million would comprise both public and private funding and be channelled into advanced technologies and joint research-industry projects through a fully-fledged ATO.

16 MBIE could provide the SSAG with more information on some potential characteristics of a fully formed ATO, including its funding model that could be introduced in phase 3 of the transition pathway (as seen in Annex 1, 'Transition Path').

TRANSITION PATH – For consideration, we present a possible transition path that gradually builds out our national innovation system with critical tech functions over a period of 20 years

17 Annex 1 outlines a high-level transition pathway from our current state to a future state (underpinned by a fully-fledged ATO that is supported by broader tech functions present in our national innovation system).

18 The basic logic of this approach is to gradually build out our innovation system and increase public investment in R&D over time, resulting in the establishment of an ATO based on economic success and effective research-industry relationships. This minimises risks [redacted] Free and frank opinions

19 Broadly, the transition path would unfold in 5 key phases:

a. **Phase 1** takes the opportunity to reprioritise around $35 million into a tech leadership and foresighting unit that scales up the future economy and industry-connecting functions of NZPA's already successful model. It may take a couple of years to transition and ensure this unit is able to properly support the tech leadership function. The higher-order tech leadership function would, then, convene key public and private stakeholders under a single governance banner to identify the most promising opportunities for investment in advanced tech going forward, ensuring industry buy-in and joined risk-taking.

b. **Phase 2** establishes a funding platform (e.g., at an amount of $150 million per annum) directed by the tech leadership function and creates new CoREs under its own governance (not led by TEC). We know that CoREs have been successful in developing new areas of world-leading expertise, and those underperforming have also been closed by the programme. This is our starting point for investment in either existing or new areas of tech capability, informed by industry appetite. The CoREs would be supported only for a time-limited period of maximum 7 years.

c. **Phase 3** takes advantage of success areas and retires poor performers. Areas of success are canvased under a single institutional umbrella, underpinned by a dedicated funding model. Together, these align promising areas more strongly with industry. Over a period of 5 more years, this funding model also enables high performing areas, which successfully collaborate and develop with industry, to scale up. The tech leadership and foresighting unit guides the development of the umbrella institution, also scaling up over time.

d. **Phase 4** identifies areas of strength where industry is maturing and has sufficient capacity and incentive to own and lead these areas. Where possible, capability of research centres that have been working most closely with industry are further internalised by industry. To this end, they are transformed into Cooperative Research Centres (CRC). Such Centres are industry-led joint research/industry research projects funded by higher contributions from industry. With the formation of CRCs, there is opportunity to develop innovation clusters with more substantial provision of research infrastructure and technology platforms. The clusters would co-locate research and industry and enable a nascent ATO to develop strong spokes/nodes at hubs where industry and research intersect.

e. **Phase 5** formalises the growing umbrella network. It establishes a fully-fledged organisation at its centre with support of a dedicated governance and administrative body. This ensures a critical mass of research capability is consolidated under an effective tech leadership and foresighting unit. The new organisation now has critical mass and can operate as a strategic anchor and first mover to develop innovation ecosystems in new areas of the economy. The new ATO can also:

   i. apply concentrated expertise at scale on solving industry problems

   ii. attract and retain talent, and worldclass leadership

   iii. draw international engagement, investment and firm clustering

   iv. establish brokerage legitimacy

   v. anticipate future economies and take advantage of promising opportunities to develop new areas of competitive advantage.

Analytic prompts

20 There is a need for a clear vision supported by criteria/objectives to guide policy. The SSAG may wish to consider what criteria/objectives are most important and should be applied to any analysis of options of an Advanced Technology Initiative going forward.

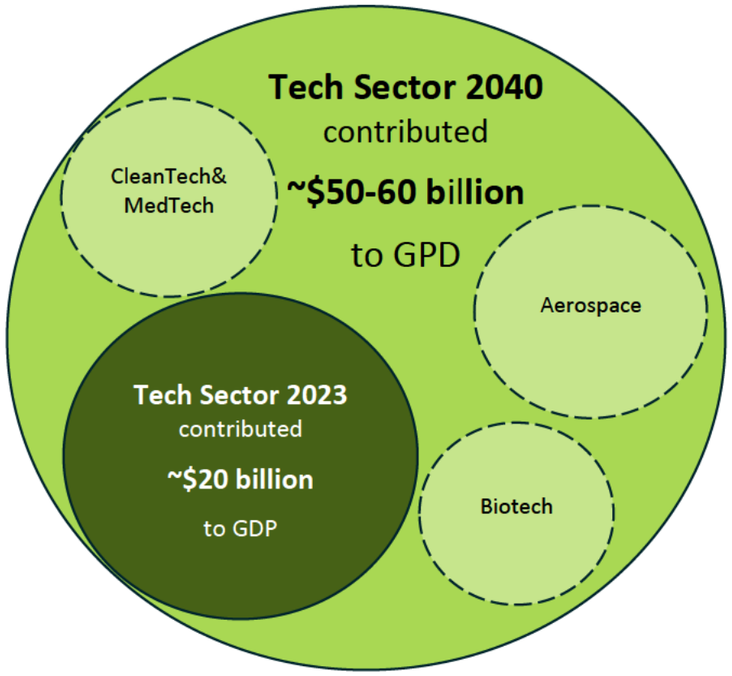
21 We need to consider the future state of New Zealand's national innovation system and the extent to which this includes technological capability to better enable innovation and economic competitiveness. The SSAG may want to consider potential transition paths from our current state to a future state, factoring in a fiscally constrained environment.

22 The SSAG may want to consider the functions outlined, their criticality, and what forms these could take in our system, inspired by both New Zealand models and international examples.

23 Finally, we recommend the SSAG reflect carefully on the strategic role of critical functions, specifically, their positioning in relation to New Zealand's conditions, industry maturity and economy, and what forms would most effectively realise needed strategic roles in our context.

Annex 1: From Start-up to Scale-up Economy 2040

Future Competitive NZ Tech Sector 2040



NZ's Tech sector 16-20% of GDP in 2040+
(Compared to 8% of GDP in 2024)

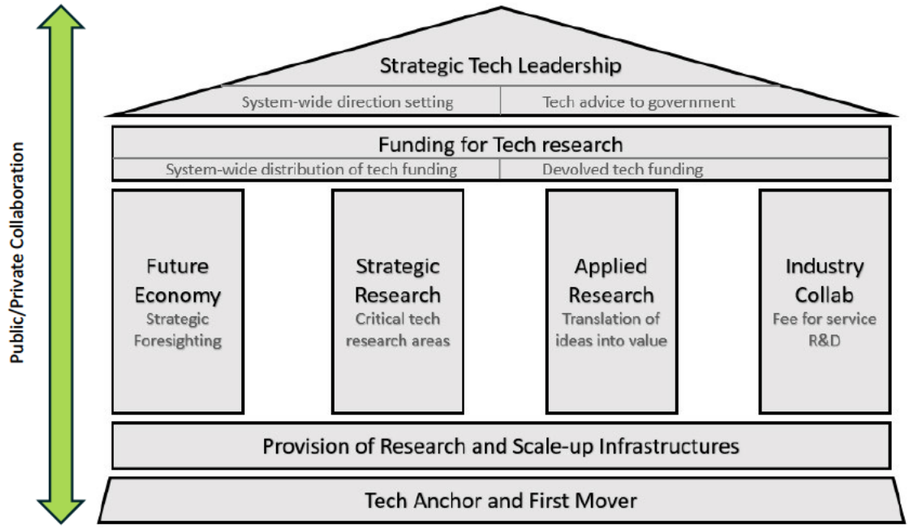
NZ's Tech sector nearly triples in size
(Compared to double between 2013-2023)

Fast annual employment growth at ~7%
(Compared to ~2% of the NZ wide economy)

Tech sector exports ~50-70 billion in 2040
(Compared to 9.8 billion in 2022)

Sustained tech export annual growth ~20%
(Compared to 25% in 2022)

Transition Path to Embed Critical Tech Functions



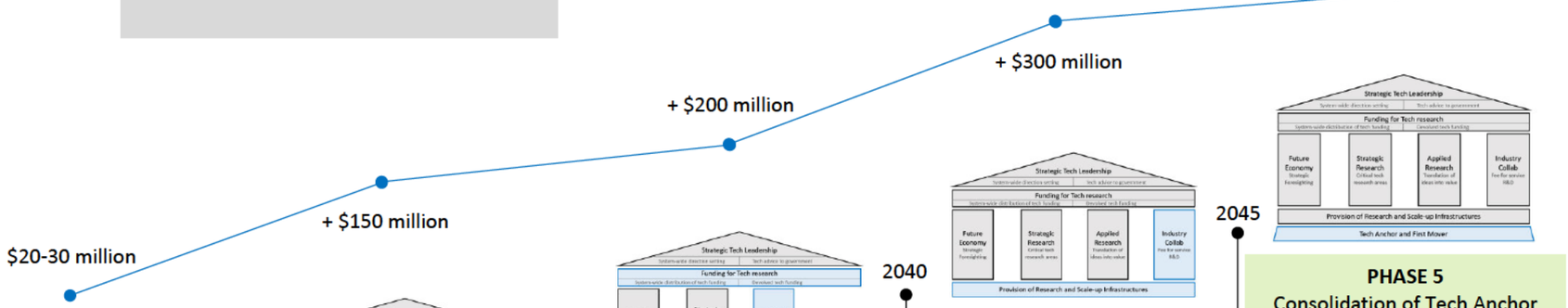
A Global Location of Tech Activities

In the last 20 years New Zealand has managed to shift its positioning from a primary industry and agricultural outpost to a global location of Tech activities across innovation and manufacturing value chains, including Aerospace, MedTech, CleanTech, BioTech, and others.

Scale-up Nascent Industry-Research Engagement in Initial Priority Tech Areas

PHASE 1 (2+ Years) and **PHASE 2** (7 Years)

- Grow Initial: Provide funding security & new investment into existing high-priority Tech areas:
  - MedTech via ABI/HealthTech Accelerator
  - Space via Robinson Institute and Christchurch Aerospace, and a potential space mission.
- Create New: Invest in strategic Tech areas to:
  - introduce innovative, emerging, and cutting-edge technologies with significant potential to lift NZ's economic competitiveness, and
  - reduce or prevent strategic dependencies.



PHASE 1
Tech Leadership & Foresighting

- Establish a joined up Govt/research/industry Tech governance structure (council or committee).
- Tech transfer, foresight, Tomorrow's Economy, research-industry broker: scaled-up version of the NZPA model.

2027

PHASE 2
Funding for Critical Tech Areas

- System-wide tech funding platform
- Create Centres of Research Excellence (CoREs) through a curated competitive research-industry collaborative process.
- Grow existing (e.g. MedTech & Space) and build new strategic research programmes in Tech areas and emerging industrial opportunities, supported with limited time baseline funding for 7 years.

2035

PHASE 3
Crank-up Industry Orientation

- Canvass successful CoREs under single institutional umbrella. Phase out poor performers. Scale up high performers.
- Enhance research focus on industry with new funding model: 1/3 institutional; 1/3 competitive, and 1/3 industry).
- Devolved funding as steering mechanism that links funding to success. Centres receive base funding relative to degree of industry engagement and attraction of external (private) funding sources.

2040

PHASE 4
Scale-up Industry Collaboration

- Establish Cooperative Research Centres (CRCs): Where industry is maturing and ready to own more research capability (Govt needed less), research centres are transferred out and remodelled into industry-led collaborations between industry, researchers, and end users.
- CRC funding model (grants) provides medium (3 years) to long-term (10 years) time-limited matched funding for 50% of project costs for industry-led research collaborations.
- Formation of innovation clusters and public/private provision of infrastructure

2045

PHASE 5
Consolidation of Tech Anchor

- Establish Advanced Technology Organisation (ATO) at the core of the institutional umbrella network canvasing high-end tech research capability and tech platforms, supported by governance and administrative body.
- ATO has critical mass, enabling it to:
  - Apply concentrated expertise at scale on solving industry problems
  - Attract and retain talent, and worldclass leadership
  - Draw international engagement, investment, and firm clustering
  - Establish brokerage legitimacy.
- First mover can develop innovation ecosystems in new areas of economy.

2+ Years | 7 Years | 5 Years | 5 Years | Reaping rewards –> Continued Growth

Annex 2: Critical Tech Functions in New Zealand's National Innovation System 2040

A possible structure of our national innovation system with critical functions for technological advancement and economic competitiveness

Tech Advice to Government

Sensing, scanning, foresighting, and the identification of domestic and international demand, emerging industrial and business opportunities, including critical technologies for New Zealand that need protecting or provide unique opportunities.

System-wide Direction-setting

Government (chaired by PM) in partnership with industry (key actors) with support of expert advice identify tech priorities, focus areas of innovation, economic opportunities for New Zealand, and areas of collaboration with industry.

System-wide Distribution of Tech Funding

Decision making around distribution of significant ($300m+) tech-related research funding, potentially including managing tech research organisations/institutes (e.g. new Tech CoREs, innovation clusters, industry collaborations).

Provision of Research Scale-up Infrastructure

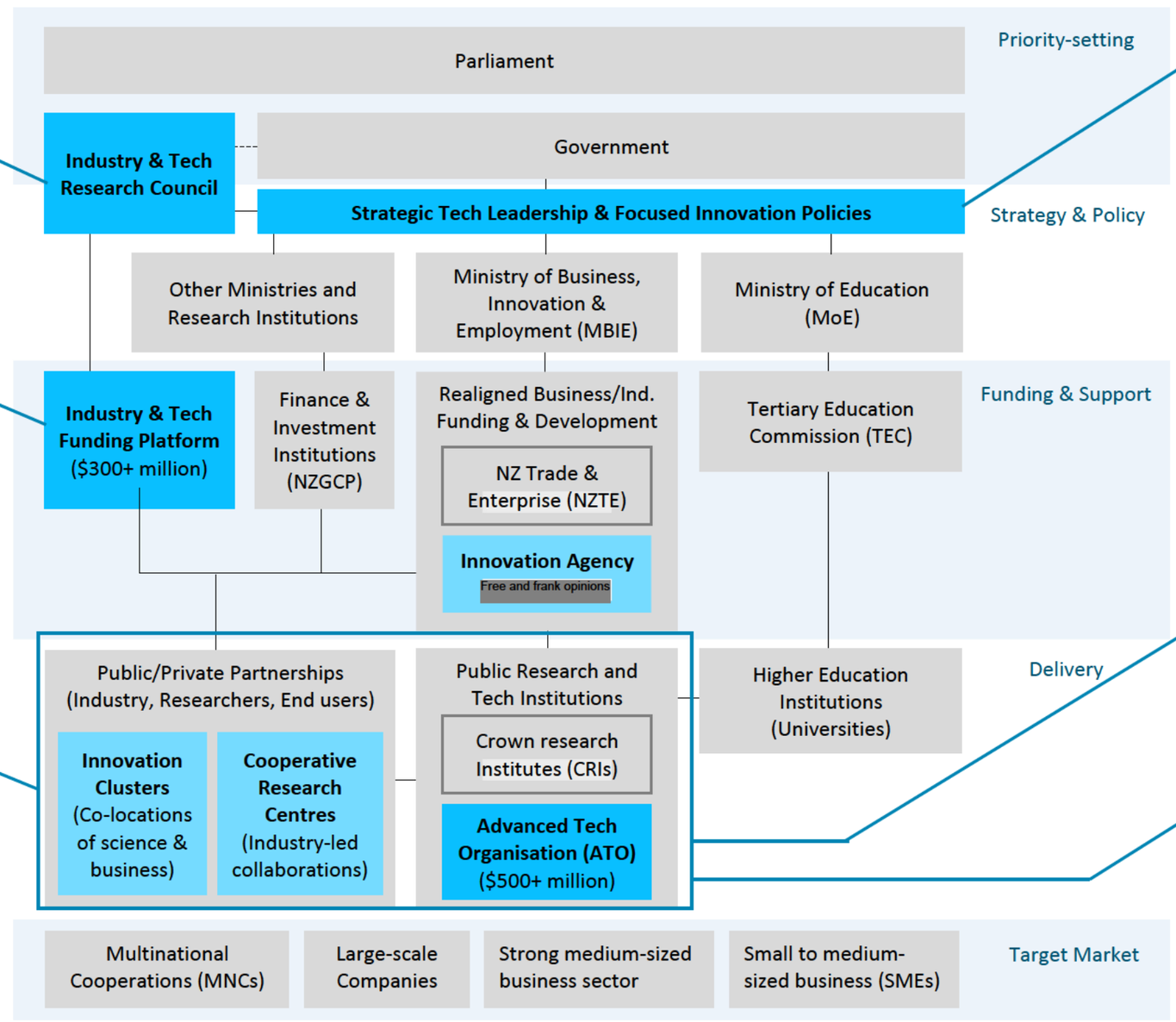
Access to state-of-the-art infrastructure (TRL 1-3), including physical space and kit, to undertake research, as well as scale-up facilities to bridge gap to commercial viability (TRL 4-6), and the capability to use such infrastructure effectively.

Tech Anchor & First Mover

Provide enduring vehicles with significant draw around which activity can grow. They attract talent, international collaboration, investment, and firm clustering. Have scale to 'act first' in risky environments and shape the landscape rather than respond to it.

Research and 'Fee for Service' R&D

Undertakes precompetitive and precommercial research in strategic fields that address needs and markets that shape the future. Provide direct R&D to reduce barriers to entry for industry R&D (high fixed costs to get into R&D).



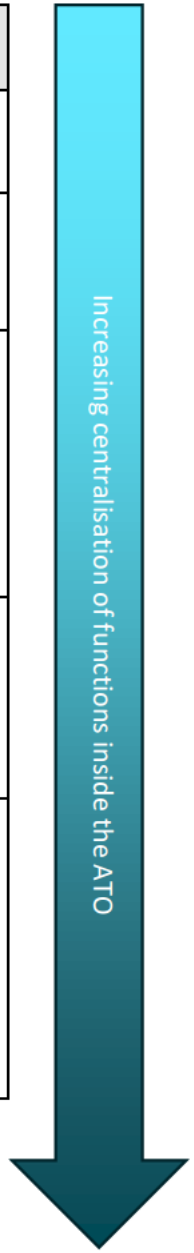
Annex 3: Critical Design Questions for Technology Supports in NZ's National Innovation System

Critical Functions	Key Questions for New Zealand
Strategic tech leadership	**Policy Questions**
<u>System-wide direction-setting</u> Identification of tech priorities, focus areas, economic opportunities for New Zealand, and areas of collaboration with industry.	**First-order question:** • Do we want to have a tech direction setting function embedded in New Zealand national innovation system? • Who should own this role? **Second-order questions:** • Should this function sit within or outside of, or at arm's length of government? • If within government, should this function sit within MBIE or some other government department? • If at-arms-length, should it be a commission or a Crown entity? • If joined up (Govt & industry), should it be a joint Govt-Industry Tech Research Council?
<u>Tech advice to Government</u> Sensing, scanning, foresighting, and the identification of domestic and international demand, including critical technologies for New Zealand that need protecting or provide unique opportunities.	**First-order questions:** • Do we want to have a tech advisory function for government embedded in our national innovation system? **Second-order questions:** • Should a Ministry (e.g. MBIE) or central agency (e.g. DPMC) internalise this function, like a unit in a department? • If not, should this function sit outside of government or at arm's length? → within an ATO or some other entity in NZ's existing SI&T sector? • Could the advisory function sit within a forum, commission, or advisory board?
Funding for tech research	**Policy Questions**
<u>System-wide distribution of tech funding</u> Decision making around distribution of significant ($300m+) tech-related research funding, potentially including, managing tech research organisations/institutes (e.g. Tech CoREs).	**First-order questions:** • Do we want to have a dedicated system-wide/sector (possibly cross-sector?) funder role for technology embedded in our national innovation system? **Second-order questions:** • Should a Ministry (e.g. MBIE) or central agency (e.g. DPMC) fulfil this role? • Should the funder role be delivered at arm's length of government – for example, by a commission, a research council or a new entity (like a Crown entity, similar to 'Tekes')? • Should the system-wide funder role be combined with or separated from an entity that hosts a research delivery function, like an ATO?
<u>Devolved tech funding</u> Independent decision making around allocation of significant funding negotiating national strategy and priorities with market signals, industry conditions, local demand, and emerging opportunities	**First-order questions:** • Do we want to have independent and specialised institutions allocate public funding into research and strategic and emerging tech-growth opportunities? **Second-order questions:** • Is financial and commercial independence of an ATO, or any other type of enity, valuable? • Do we consider the form of an organisation (Crown entity/company) a smart idea approach to embed an anchor vehicle with significant draw in our national innovation system that could counterbalance how our current institutional landscape determines the balance of our SI&T strategic investment portfolio?
Provision of research and scale-up infrastructure	**Policy Questions**
Access to state-of-the-art infrastructure (TRL 1-3), including physical space and kit, to undertake research, as well as scale-up facilities to bridge gap to commercial viability (TRL 4-6), and the capability to use such infrastructure effectively.	**First-order questions:** • Do we want to improve the provision of research infrastructures, Kit and tech platforms in our national innovation system? **Second-order questions:** • What delivery vehicles should we consider – e.g., a national investment strategy? Dedicated research infrastructure organisations? Could an ATO be a suitable vehicle? • How do we take advantage of public/private joint action/venture approaches to work with industry and crowd-in capital as well as attract private investment?
Research and 'fee for service' R&D	**Policy Questions**
Undertakes precompetitive and precommercial research in strategic fields that address needs and markets that shape the future. Also provide direct R&D services (e.g. testing helps get smaller/younger businesses access to expertise and equipment) to reduces barrier to entry for industry R&D (high fixed costs to get into R&D).	**First-order questions:** • Do we want to build a critical mass of critical technology research capability in our national innovation system? **Second-order questions:** • If yes, how do we create it? Do we link up/network/coordinate existing capability (Callaghan experiment) or do we consolidate capability? Should we build new capability? • Whether we network or consolidate, what value is there in integrating high performing/promising tech-research areas under a broader umbrella, possibly through an ATO? • What balance of roles should advanced technology supports for industry play in terms of research: Technology diffusion? Strategic research? Demand-driven research?

Tech anchor and first mover	Policy Questions
Provides a stable and enduring vehicle with significant draw around which related activity can grow. It attracts talent, international collaboration, investment, and firm clustering. Has scale to 'act first' in a risky environment and shape the landscape rather than respond to it. Are launch pads that builds spin-off companies.	**First-order questions:** • Do we want ecosystem first movers to help build new capabilities/capacities in our national innovation system to promote new industries and economies of the future? **Second-order questions:** • Should we look to attract international talent, investment, and partners alongside firm clustering? • Should we consider creating an ATO to fulfil this function? • If yes, what form should the ATO take for NZ, to build critical mass, anchoring (draw) and first mover capacity to kickstart innovation ecosystems and innovation clusters?

Annex 4: Description and Evaluation of New Zealand Models

Archetype	Model	New Zealand or international example	Description
Funding	Contestable tech-focused fund	Add a Tech panel to Marsden or a new stream to Endeavour	• Hands-off funding mechanism & no mandate for strategic direction • Stimulates additional tech research through directed funding • Project based funding limits long-term, enduring investments
	Co-designed project and platform funding	SfTI-like Spearhead and Seed project funding Advanced Energy Platform	• Active funder working within pre-defined remits • Modest ability to direct resources and identify opportunities, but still very beholden to the wider research landscape • Project/platform based funding limits enduring nature of investments
	Tech Research Council	"HRC for tech"	• Active funder with significant mandate to set priorities and allocate resources – strategic leadership role • Can fund variety of activities including research, capability dev., institutions or connectivity; enduring investment decisions possible • Still beholden to wider research landscape – can call for activity but no direct role in implementation • Not obvious role in coordination of system activity or brokering between private and public sectors
Network	Tech research capability network coordinator	NZPA	• Hosted but largely independent centralised function that performs connectivity, prioritisation and foresighting, with research capacity provided through direct funding to network partners • Largely reliant on existing system capability – limited ability to build capacity in new areas • Reliant on host/partners for infrastructure provision
	Centre(s) of Tech Excellence	MacDiarmid, Dodd Walls	• Largely devolved funding to network of research orgs, with one network org acting as a host/contracting entity (largely symbolic) • Centre leadership can significantly direct funding and activity, though subject to funding agreement and host org collaboration • Limited ability to own infrastructure, and host orgs may constrain nature of interactions with private sector (eg unis seeking commercial revenue in a way that isn't best for NZ Inc) • Somewhat mixed on enduring nature – virtual orgs can come and go, but successful Centres have so far endured in New Zealand



	Hosted hub-and-spoke	Antarctic Science Platform (ASP)	• Similar to a Centre, but more enduring in form, and with stronger ability for Government to steer • In the case of SfTI and ASP, the host is very hands-off, allowing the Platform a high degree of flexibility and direction-setting • Still limited ability to actually own things – capability and infrastructure supplied by partner orgs (Could have a dedicated infrastructure partner?)
Organisation	Infrastructure provider	Outset Ventures	• Organisation that owns and provides tech-related infrastructure, expertise to use that infrastructure and broader support and networking services • Direction-setting largely exists in ability to invest in specific infrastructure, or prioritise use of that infrastructure
	Mixed hub-and-spoke	Food Innovation Network	• Hub and some spokes are independent organisations, other spokes are hosted or subcomponents of larger orgs. • Independent hub/spokes able to own things (infrastructure, people) and easily engage with private enterprises • Can be awkward if the hosted parts of the organisation aren't fully aligned to the strategic vision, especially if there's mismatch in scale
	Independent hub-and-spoke	Fraunhofer (DE)	• All parts of the org are independent • Central hub provides majority of leadership and prioritisation functions, with the doing of research and sector-facing function devolved to largely independent but owned spokes • Hub has full control of resourcing across spokes, without needing to account for external host interests. • With strong central leadership, hub can prioritise across spokes, wind down or stand up spokes without capture (spoke interests)
	Centralised tech/innovation agency	Callaghan Innovation without the grants and business functions	• Organisation 'owns' most things (infrastructure, leadership functions, some research capability), but partners or contracts for some needs • Possible conflicts of interest between innovation and research functions – possible capture of resources by centralised agency
	Crown Research Institute	IRL 2.0	• Organisation owns everything, high degree of centralisation • May be challenges with partnering or funding 'best' activity if it sits outside the institution – also may limit scope of expertise/provision

High level evaluation of New Zealand Models against an initial set of policy objectives

1. International examples and New Zealand models show that we have a variety of options to imbed functions in our national innovation system. Table 1 assesses at a high-level how suitable certain models are to house and deliver critical functions for technological advancement:

Table 1a. *Assessment of models for housing and delivering critical tech functions*

Criteria – Functions	Policy/Gov	Fund	Network	Organisation
Focus - systemwide strategic tech leadership	✓	✗	✗	✓
Incentives – system significant tech resource allocation	N/A	✓	≈	✓✓
Kit – research infrastructure & tech platforms	N/A	≈	≈	✓✓
Pull – strategic anchor and ecosystem first movers	N/A	✗	≈	✓✓
Scale – strategic research	N/A	N/A	✓	✓✓

Table 1b. *Assessment of models against cost and risk*

Criteria – Costs/Risks	Policy/Gov	Fund	Network	Organisation
Upfront cost – bulk investment and new funding requirement	N/A	N/A	Moderate to high	High
Transition path – 'Yes' (form change over time) or 'No' (pretty much set up in one point in time)	N/A	N/A	Yes, form can evolve over time	Narrow form changes, but scale can change a lot
Terminability – financial liabilities and legal risk	N/A	High flexibility and ease of contracting	Fair bit of flexibility and ease of contracting	High risk due to liabilities: Independent legal entity